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ABSTRACT

The design of a school anxiety questionnaire is described. The model predicts a maximal relationship between anxiety and performance when type of anxiety potential, type of stress, and type of behavior are in parallel. The test, developed with intermediate school children, is a five scale 105 item multiple choice questionnaire with responses on a 5-point Likert scale. It is administered to children in their classroom with the teacher absent. Instructions are read aloud at 5 second intervals by a tape recorder. The student marks his response on a mark sense sheet for data processing. Three hundred and twenty student responses were factor analyzed using a principal axis factor with a normalized varimax rotation. To examine factor structure stability over age, data for third and sixth grade subjects were factored separately and their rotated structures compared using Kaiser's coefficient of factor stability. In spite of their brevity the SAQ Anxiety scales reflect adequate levels of reliability and have predictive validities that are in theoretically meaningful directions, are of a magnitude not commonly reported, and are generally replicable, both across age groups and across studies. (DJ)

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THE INVESTIGATION OF CHILDREN'S SCHOOL ANXIETY:

A THEORY, PROCEDURE, AND RESULTS¹

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The research I am about to report this morning was just beginning some two years ago when its conceptual underpinnings were described in an APA symposium with Dr. Spielberger who is here on our symposium today. Essentially, the work I am about to describe is concerned with identifying, measuring, and determining the effect of those aspects of anxiety that might best be described as children's school anxiety.

THEORY

The work I shall discuss has been guided by four assumptions: 1) that anxiety is an experience common to all individuals; 2) that it is a reaction elicited by stress conditions; 3) that the relationship between anxiety reaction and its eliciting stressor stimuli, and the modes of coping with that reaction (i.e., one's defenses) are, in part, learned; and 4) that an individual has a specific potential for anxiety arousal for each type of situation he encounters.

Whether or not an anxiety reaction develops depends on two things: the strength of the potential and the type of cues provided by the situation encountered by the individual. In other words, anxiety arousal is held to be a function of reaction potential and type of situation, $A = f(P, S)$. The occurrence of an anxiety reaction is presumed to have an affect on behavior. Thus, if behavior is in part a function of anxiety, then, by substitution, behavior is, in part, a function of an individual's reaction potential and the situation in which he finds himself, $B = f(P, S, \dots)$.

The effect of an anxiety reaction on behavior is expected to be maximal when the anxiety produced is directly relevant to the behavior required of the individual. For example, test anxiety would be expected to have a greater affect on test performance than on recitation performance. Similarly, recitation anxiety would be expected to have a greater impact on recitation performance than on test performance.

Finally, anxiety arousal is expected to be maximal when the stressor conditions are directly relevant to the individual's type of anxiety potential. It is assumed, for example, that test anxiety is more apt to be aroused by test stress cues than by some other class of stressor stimuli, such as, say, recitation cues.

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The model, then, predicts a maximal relationship between anxiety and performance when type of anxiety potential, type of stress, and type of behavior are in parallel; that is, all other things equal, effect on behavior will be maximal when $B = B_j$, $P = P_j$, and $S = S_j$.

THE SCHOOL ANXIETY QUESTIONNAIRE

SCALE DEVELOPMENT

In March of 1966, 160 items expected to cluster around several *a priori* factors of theoretical interest were selected from a large item pool. The items were randomized and administered to 83 fourth- and fifth-grade public school children in a small city school.

Student responses were factor analyzed and those items that had high communalities and loaded well on single factors were retained to form the nucleus of a new instrument. The retained items were then supplemented with new items written to parallel the obtained factor structure, which in turn reflected the theoretical dimensions of interest.

This new battery, again 160 items, was administered to a new sample of 56 children drawn approximately equally from grades 4, 5, and 6. The results were factor analyzed once again and unit weighted factor scores were computed using a special ipsative scoring procedure developed by Bergan (1966, 1968).

Approximately 50 items comprised four anxiety scales. Each scale varied in length from 10 to 15 items. The balance of the items in the instrument comprised a Response Bias Adjustment Scale (BBAS) for use in the Bergan scoring procedure. Spearman-Brown reliability coefficients calculated from a formula proposed by Guilford (1965), were on the order of .90 to .96. Correlation coefficients with scores on the California Achievement Test, were on the order of .47 and, when the effect of age was permitted to operate, ranged as high as .64 (Schelkun and Dunn, 1967).²

Once again, those items with high communalities and strong loadings on single factors were retained and the instrument further refined and reduced to a total of 105 items.

It was this third version of the instrument which was tentatively labeled the *School Anxiety Questionnaire (SAQ)* and which has formed the basis for our subsequent work.

The present version of the School Anxiety Questionnaire is a five scale, 105 item multiple choice questionnaire. Items are of the type "How much does it bother you when you stand up and talk in front of the class?" "How nervous do you feel when you start to look at your grades?" "How nervous do you get when the teacher announces you are going to have a test tomorrow?" "How often do you worry that you might do a poor job on your school work?" and so forth.

² The signs of the correlation coefficients varied according to the nature and wording of the scale.

The subject responds on a 5-point Likert scale from "frequently," to "seldom," or "a lot" to "not much."

ADMINISTRATION

The SAQ is group administered to children in their classroom with the teacher absent. The instrument is divided into two parts which are given no less than 3 nor more than 5 days apart. The students are given a pencil, an SAQ booklet, and an IBM mark sense sheet. The instructions, and the test items, are read aloud by a tape recorder. Items are spaced at approximately 5-second intervals. The tape recording procedure paces progress through the SAQ, tends to minimize individual reading differences, and standardizes the respondents' time per response. The student marks his response directly on a mark sense sheet which is then read by an optical page scanner which automatically punches data cards. The cards then serve as computer input for the Bergan scoring program, which will be discussed shortly.

This procedure has been used successfully as low as the third grade without any apparent floor effect. By eliminating the distribution of the SAQ booklet and relying simply on the tape-recorded presentation, it would seem that the procedure would still be appropriate for second grade use. With the substitution of a simpler mark sense procedure, such as that used in the early grades by Project PLAN, it is possible the SAQ could be used as low as the first grade.

FACTOR STRUCTURE

Data were collected from 321 children drawn from three classrooms at each of grades 3, 4, 5, and 6 for the purpose of studying the SAQ factor structure. Pupil responses were factor analyzed using a principal axis factor analysis with a normalized varimax rotation.

Five factors, representing 58% of the items in the battery, accounted for 54% of the common variance. They were: Report Card Anxiety, 12%; Failure Anxiety, 12%; Test Anxiety, 11%; Achievement Anxiety, 12%; and Recitation Anxiety, 7%.³

The balance of the common variance was accounted for by the 44 items comprising the Response Bias Adjustment Scale, an intentionally, and necessarily, heterogeneous rather than homogeneous scale.

In order to answer the question of factor structure stability over age, the data for the third and sixth grade subjects were factored separately and their rotated structures compared using Kaiser's coefficient of factor similarity. The results are summarized in Table 1.

³ This latter scale had only one-half the number of items as the other scales.

TABLE 1
Comparison of Factors Obtained from 3rd and 6th Grade Data

Anxiety Factor	Percent of Total Matrix 3rd Grade	Common Variance 6th Grade	Kaiser Coefficient of Factor Similarity
Report Card	10	9	.84
Failure	11	8	.74
Test	8	8	.75
Achievement	8	14	.84
Recitation	6	8	.74

On the bases of these results we have concluded that the SAQ is a rather clean instrument, as far as factor analysis is concerned, and that it is factorily quite stable over most of the elementary school grades.

SCORING

The traditional method of scoring questionnaire responses has been either simple summation across items or some form of factor scoring where a transformation based on factor loadings is applied to the responses of all subjects before summation takes place. Factor scoring, no matter how sophisticated, however, cannot minimize the response bias inherent in an individual's protocol.

The more common types of response bias which researchers have attempted to deal with in the past have been: position set, acquiescence, social desirability, defensiveness, and the like.⁴ The standard method of dealing with the problem when data from certain subjects was felt to have an extraordinarily high amount of such bias, was simply to partition the data bank and deal with the suspect data separately, or, in more sophisticated paradigm, to use the method of covariance control.

Inasmuch as response bias was presumed to vary with the individual, special scales, such as "lie scales," were frequently imbedded in anxiety instruments in order to identify individuals with highly atypical score patterns. It should be obvious, of course, that at least a certain amount of atypicality might in fact be due to "honest" differences in how individuals subjectively interpret the meaning of the points on the rating scales they are asked to use. The basic problem then is not merely to eliminate individuals who do not fit a standard

⁴ See, for example, Hand, 1964; Foster & Grigg, 1963; Bendig, 1962; Hand & Brazzell, 1965; Rosenwald, 1961; and Ruehush, 1963.

subjects respond to the assessment instrument.

In addition, "bias" differences might also be due to an individual's tendency toward response lability, that is, the degree to which he is expansive or constricted in the use of the rating scale. One simple interpretation of response lability can be made in terms of the respondent's subjective interpretations of the meaning of the end-points of the scale. Clinical psychology, on the other hand, has a number of theoretical constructs to account for what, in the vernacular, might be called the effervescent versus uptight syndrome.

Bergan has developed a scoring procedure that tends to accommodate these bias effects. In essence, the procedure standardizes scores within individuals before comparing scores across individuals. It is analogous to the standardization of scores within tests before comparing across tests. An early description of the procedure and its effectiveness may be found in Bergan's 1966 APA symposium presentation (Bergan, 1968).

Considerable additional work on the underlying mathematical model, plus extensive simulation studies using Monte-Carlo data-generation techniques, suggest the procedure to be extremely robust. Recent results suggest that the procedure can effectively accommodate up to and including 50% error variance. Current efforts are under way to explore the upper reaches of the procedure's robustness.

RELIABILITY AND VALIDITY

The reliability and validity results reported in this section are based on data collected in two separate studies, one by Dunn in the Midwest, and the other by Zimmerman⁵ in the Southwest. Procedures were essentially identical in both studies. Both were based on middle-class, suburban school children. The subjects, 320 and 331 respectively, representing approximately equal numbers of boys and girls, were drawn approximately equally from grades 3, 4, 5, and 6.

Reliabilities are summarized in Table 2.

The samples for each study were then partitioned by grade level to avoid age and school experience contamination in the study of validity, and to afford a series of independent, replicated, studies. In both the Midwestern and Southwestern studies, one grade level of data had to be eliminated because the necessary statistical assumptions for analysis could not be met.

SAQ scale correlations with IQ and academic achievement are summarized in Table 3.

In general it may be concluded that in spite of their brevity the SAQ anxiety scales reflect entirely adequate levels of reliability and, have predictive validities that are in theoretically meaningful directions, are of a magnitude not commonly reported, and which are generally replicable, both across age groups and across studies.

⁵ Personal communication, Barry J. Zimmerman, The University of Arizona, Tucson, Arizona..

TABLE 2
SAQ Scale Lengths and Reliabilites

SAQ Anxiety Scales - Bergan Scores						
	Report Card	Failure	Test	Achieve- ment	Recita- tion	Sample N
Scale Length	14	13	13	14	6	
Spearman-Brown*	87	82	84	84	69	320
Kuder-Richardson 20**	88	88	88	91	80	331

* Tyron's (1957) approximation

** Cronbach's (1951) generalization to Likert scales;
based on raw item responses.

TABLE 3
SAQ Correlation Coefficients
with IQ and Achievement Test Performance

	SAQ Anxiety Scales - Bergan Scores						SAQ Raw Score 105 Items	N
	5 Scale SAQ R	Report Card	Failure	Test	Achieve- ment	Recita- tion		
CTMM - IQ (Total)		-18**	-14**	-17**	-04	06	-12	320
Iowa Achievement (Composite)		-30**	-29**	-24**	01	23**	-16**	320
3rd Grade		-16	02	-38**	-07	06	-19	64
5th Grade		-46**	-26*	-22*	-00	-01	-01	88
6th Grade		-28**	-25*	-30**	12	-10	-11	82
Metropolitan Achievement								
4th Grade	45***	-27**	-17*	-03	-20	13	---	116
5th Grade	48***	-31**	-15	00	-38**	04	---	108
6th Grade	45***	-39**	-07	-10	10	11	---	107

* p ≤ .05
** p ≤ .01
*** p ≤ .001

AGE AND SEX DIFFERENCES

When the relationship of age to school anxiety was considered, a variety of significant differences were found. These results are summarized in Figure 1, on the next page.

Test Anxiety and Failure Anxiety decreased significantly (.001 and .0001 respectively) with age. Report Card Anxiety also tended to decrease with age (.05). Children's concern over doing well in school, i.e. Achievement Anxiety, remained relatively constant with age; but Recitation Anxiety increased significantly with age (.001).

For the most part, the configuration of the graphs in Figure 1 are fairly stable and replicate on three-month and then on six-month follow-up data collected from the same subjects.

In general, there were no sex differences in scores on four out of the five SAQ scales. The only scale that yielded significant sex differences was Report Card Anxiety. Girls reported less Report Card Anxiety than boys; presumably because of their generally higher level of academic achievement (which was significant at the .01 level).

CHANGES IN CHILDREN'S SCHOOL ANXIETY AS A FUNCTION OF THE SCHOOL YEAR

In the Midwestern study SAQ data were collected in October, January, and then in March in order to explore changes in school anxiety as a function of the school year. It was expected that initially all aspects of anxiety would be reasonably high due to the early ambiguous nature of the classroom. It was expected that mid-year anxiety scores would be generally lower than their corresponding Fall counterparts and that as time went on and students became more and more familiar with their peers, Recitation Anxiety would continue to drop, but that, as the end of the school year came closer, Test Anxiety, Report Card Anxiety and Failure Anxiety would again increase.

Mean SAQ values, calculated across all subjects, are plotted in Figure 2. (next page.) Additional analyses of these data have not yet been made. The data suggest, however, that our initial expectations seem to be generally confirmed. In all instances, mid-year anxiety levels are below Fall anxiety levels (sign test significant at .02 level).

FIGURE 1
AGE DIFFERENCES IN SAQ SCORES

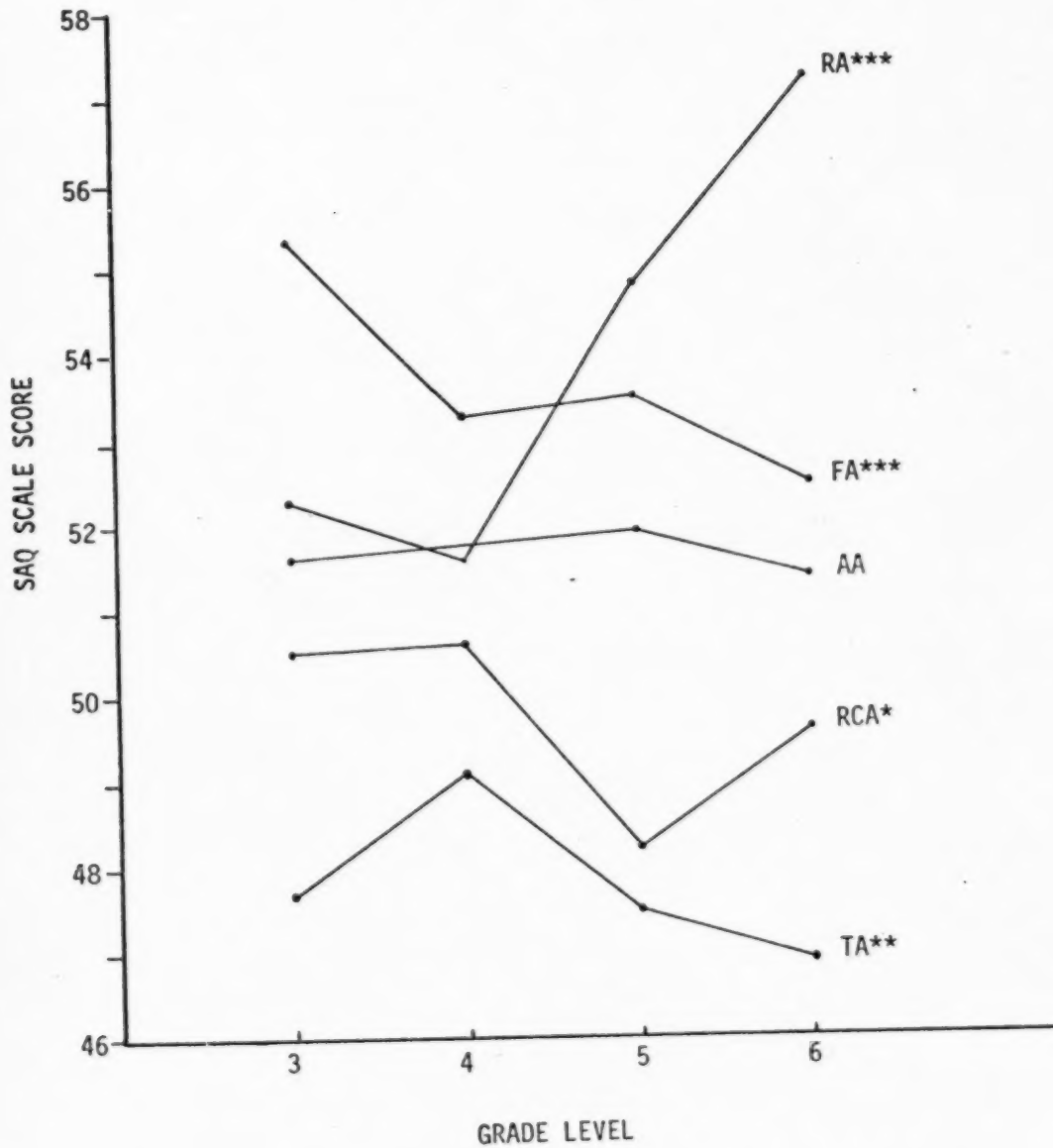
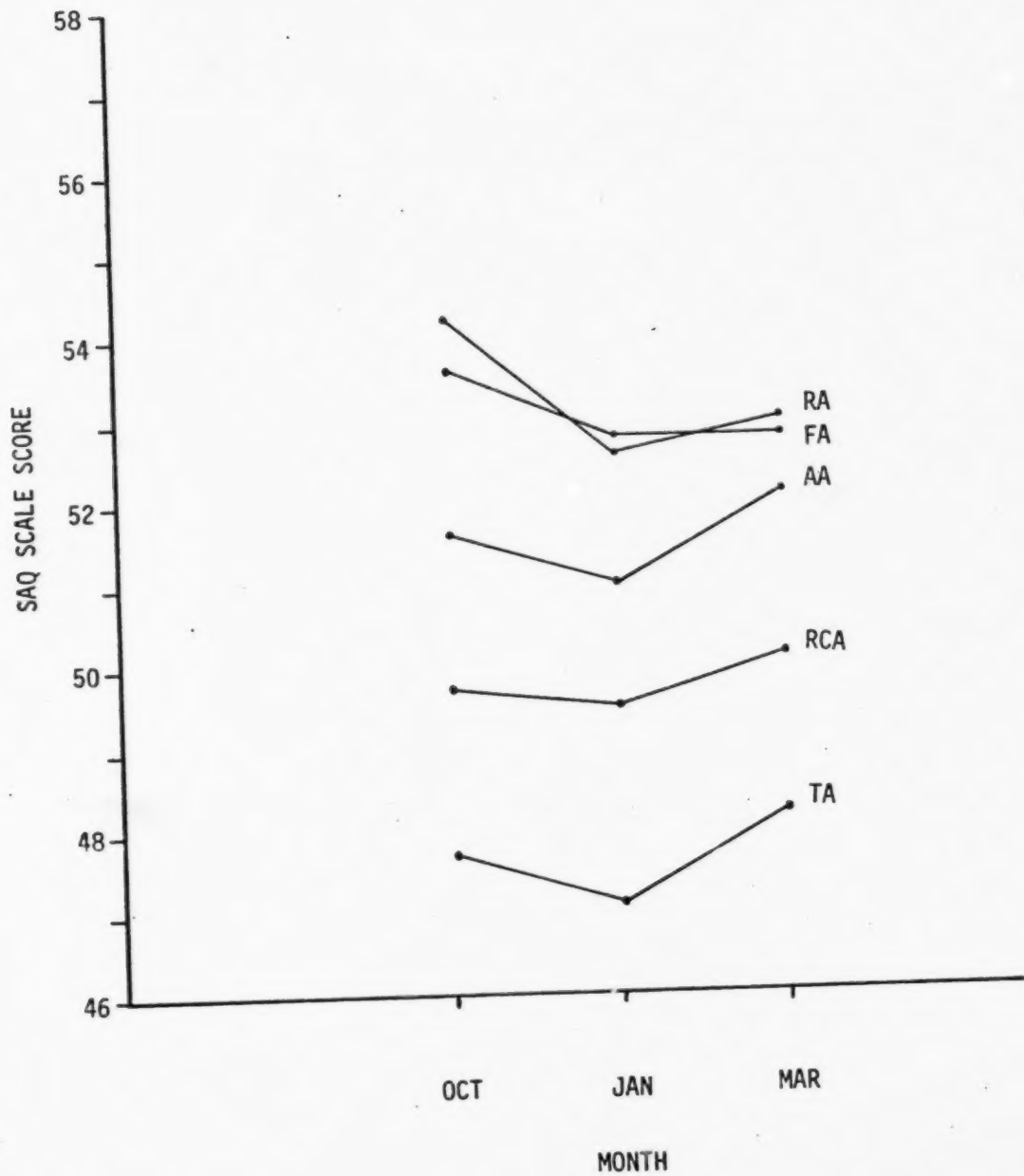


FIGURE 2
CHANGES IN SCHOOL ANXIETY AS A
FUNCTION OF SCHOOL YEAR



CONCLUSION

I shall not take any further time to go into speculation regarding these results. I shall leave that for our discussants. My purpose today has been merely to share the SAQ procedure with you and make some of the results we have obtained with it public.

In conclusion I should only like to observe that the SAQ seems to have a certain measure of constant validity, and, given the brevity of this experimental version, seems to have a reliability and predictive validity that is somewhat greater than many similar instruments. The decrease in Test Anxiety and Failure Anxiety with age and the increase in Recitation Anxiety seems reasonable, as does the finding of no significant change in children's desire to do well, i.e. Achievement Anxiety.

REFERENCES

- Bendig, A. W. A factor analysis of "social desirability," "defensiveness," "lie," and "acquiescence" scales. *Journal of General Psychology*, 1962, 66, 129-136.
- Bergan, J. Visual imagery and reading achievement. Paper read at the American Educational Research Association meetings in February 1966.
- Bergan, J. R. A special scoring procedure for minimizing response bias on the School Anxiety Questionnaire. *Psychology in the Schools*, 1968, 5, 210-216.
- Cronbach, L. J. Alpha coefficient of internal consistency. *Psychometrika*, 16, 297-331.
- Dunn, J. A. The theoretical rationale underlying the development of the School Anxiety Questionnaire. *Psychology in the Schools*, 1968, 5, 204-210.
- Foster, R. J., & Grigg, A. E. Acquiescent response set as a measure of acquiescence: Further evidence. *Journal of General Psychology*, 1963, 67, 304-306.
- Guilford, J. P. *Fundamental statistics in psychology and education*. New York: McGraw-Hill, 1965.
- Hand, J. Measures of response sets. *Psychological Reports*, 1964, 14, 907-913.
- Hand, J., & Brazzell, C. O. Contamination in measures of acquiescence and social desirability. *Psychological Reports*, 1965, 16, 759-760.
- Rosenwald, G. C. The assessment of anxiety in psychological experimentation: A theoretical reformulation and tests. *Journal of Abnormal and Social Psychology*, 1961, 62, 666-673.
- Ruebush, B. E. Anxiety. In H. W. Stevenson, J. Kagan, & Spiker (Eds.), *Child Psychology: Yearbook of the National Society for the Study of Education*, 1963, 62 Part I, 460-516.
- Schelkun, R. F., & Dunn, J. A. School anxiety and the facilitation of performance. Paper presented at the meeting of the Midwest Psychological Association, Chicago, May 1967.